SORCERER'S APPRENTICE

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Welcome

by Tommy Stokes

The Sorcerer and the Sorcerer's Apprentice live on. This is a credit to the Sorcerer. It is a tough machine, while others with much better support have not survived. No machine has had more devotion from its owners than the Sorcerer.

Don't despair! The Sorcerer is a very fine machine and will do what you need it to do. There are Sorcerer owners all over the world who have mastered their machines and are using them successfully. You can, too.

Have you noticed the by-line and wondered who or what Eaglenest Software is? It is a group of dedicated Sorcerer owners living in Arkansas who love their machines. Eaglenest is composed of Edward King, Andy Marts, and Tommy Stokes. Ed and Andy are electronic technicians, and I'm a business instructor with programming experience. We are very appreciative of all the support and information we have gained in the past from the Sorcerer's Apprentice and wish to pay back some of that by keeping the Apprenctice alive for another year. We are volunteering our effort in the hope that we can be a source of informaton transfer to you the Sorcerer owners.

You can help us out. First, resubscribe for $18.00, that will allow us to print 6 issues for Volume six. Second, tell us what you are doing, what you need, ask questions about your problems or just write to say hello.

Remember if you write in, you will probably see your name in print. Didn't you always want to be famous!! So, help your fellow Sorcerer owners. Write about what is happenning with your Sorcerer good or bad.

Comming in future issues will be burning of bipolar PROMS (Bruce, S-100, etc.) and more about the sorcerer. If anyone has ideas about interfacing for the sorcerer or hardware modifications please contact us. All ideas appreciated.

EPSON PICTURES FROM EXEC-A-SKETCH

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Exec-A-Sketch from Ensign Software is a dandy program for making drawings on the Sorcerer screen. You can draw with single dots for high resolution, or you can use a Radio Shack type of medium resolution. In addition, there is a text mode which allows you to put captions on your work of art. When it is finished, you can save your drawing on tape and play it back at some future time.

One feature that you would very much want is the ability to print the screen display on paper. For owners of the IDS-440 Paper Tiger, this facility is included. Unfortunately, there are far more Epson printers in use than Paper Tigers. Since I had written some screen dump routines for my Epson MX-80, it was natural that I would want to hang them on Exec-A-Sketch.

Another very useful feature of Exec-A-Sketch is the following help table that allows you to review the commands at any time by simply typing CTRL-H. Then, when you press any key with the help table on the screen, your precious design reappears. On the right side of the display, you can see the four commands that have been added for Epson printing. The condensed format gives a small, high-density picture. The other three formats give pictures so large that only 60 characters per line can be put on the paper. Later in this article, we will discuss these modes in more detail.

COMMAND DISPLAY

All Modes:

CTRL-F = fine pt	CTRL-C = monitor MX-80 printing	
CTRL-M = meduim pt	CTRL-S = save	CTRL-B = condensed
CTRL-T = text mode	CTRL-L = load	CTRL-K = first 60 chars.
CLEAR = clear	CTRL-H = help	CTRL-N = middle 60
CTRL-P = print on Paper Tiger		CTRL-O = last 60

Use any of the eight directional keys on the numeric pad or the joystick to position the cursor or pen point.

Text mode:

CTRL- = move column up	CTRL- = move row right
CTRL- = move column down	CTRL- = move row left

Pressing any letter, praphic or numeric key (except directional keys) will cause the associated character to appear in the current cursor position.

Drawing modes:

U = pen up
D = pen down
I = use ink
E = use eraser
M = mark line start
L = draw line from marker to pen

Since 4 new commands were added, it was necessary to modify ths help table considerably to include those commands. Since the old help table occupied nearly all of the screen, there was no obvious spare space for new information. Therefore, it was necessary to redesign the table so that the new commands would fit into the space of the original table. The new code for this table is at the end of this article in the form of a monitor dump.

The Problem

Once you have a drawing on the screen, you do not want to pollute the display by typing commands as we do with the monitor. Instead, Exec-A-Sketch responds to a set of control codes to print the display, save the display, etc. Since the control codes do not normally put anything on the screen, they do not ruin the display.

To receive these control codes and to choose the desired routine, Exec-A-Sketch has two series of compare and jump instructions. Each of them asks if the code is something that the program can handle and, if it is, switches the program to the correct routine. What we want to do is to invade those two series so that the control codes we will add for the Epson printers will also be recognized.

A fairly convenient place to make that invasion is at the two places where the code for Paper Tiger printing is chosen (12C0 and 18C9 Hex). To understand what must be done, we must examine the original code a bit. With the control code in the accumulator, the code is identified with a compare command (e.g. CP 10h). If the code is not that value, the routine jumps to the next compare command. If the code is 10 hex (CTRL-P), first the cursor is removed by replacing it with a space, then the Paper Tiger routine is called, the cursor is restored, and the program jumps back to the routines used before the control code was typed.

What we want to do is to insert a CALL command at these two places to redirect the search for control codes to our Epson routines. Then we can search for the codes we will add. A convenient place for those new routines happens to be at the end of the original program at 2210 hex. That is fortunate, because some programs use the space at their ends to store data.

After we get into the Epson routines, there is the problem of getting back into the original program. It is a problem for more than one reason. First of all, we are jumping back to one of two possible places. Therefore, we must keep track of the return address. Second, depending on what is accomplished in the Epson routines, we want to jump back to one of three possible places in the original routine. If the control code is for Paper Tiger printing, we must go back to the full Paper Tiger routine. If the code is for Epson printing, we must go back to the jump instruction which leads to normal operation. If the code is not for printing at all, we must go back to the code that will continue the search for the correct routine.

As the following assembly listing shows, to do all of this, we put a CALL instruction into 12C0 and 18C9 followed by a NOP. This will replace the CP instruction for the Paper Tiger and the following JR which sends the program to the following CP's in the series. Once we have arrived in the Epson routines, we test for Paper Tiger printing first. If that is the choice, we simply return to the NOP which leads to the proper print routine. Next, we test for the four print routines we have added for the Epson printer. If we find one of them, we do the printing and modify the return address to continue the search for the right routine for the typed code.

Use The Parallel Port

Once we know how to get into and out of our new routines, we can make some decisions about those routines. Because it is convenient to send whole bytes of 8 bits to the printer and the Centronics output from the Sorcerer gives only 7 bits, this Epson patch uses the Sorcerer "parallel" output. The serial port is also not very good because not all of the serial boards for the MX-80 are compatable with the Graftrax ROM's. Besides, you would want to reserve the serial output to access the telephone through your modem.

If you are determined to have seial output, search in the routine for these combinations: CD 21 E0 (CALL PARLOT). Each one must be changed to CD 12 E0. In addition, the baud rate must be set with the monitor SE T=? command to suite your printer.

Changing to Centronics output is more dificult because there are only 7 bits to use. Not only must you change those CD 21 E0 combinations, but you must collect dots from the screen in groups of 7 not 8. Because the Sorcerer screen uses 8 by 8 blocks of dots for each character, it is easier to deal with groups of 8 dots. In addition, you must change the distance between the lines on the printer because there will be only 7 dots per line. In conclusion, you must rewrite the routines for Centronics output, so change your connections to the parallel output and save a great deal of work.

480 or 960 Dots?

Because the Sorcerer and the printers differ in the number of characters per line and the number of dots per character, it is convenient to have two routines to connect the Sorcerer to the MX-80. The Graftrax ROM's allow you to have 480 or 960 dots per line; the Sorcerer produces 512 dots horizontally.

The problem with the 960-dot display (CTRL-B) is that the 512 dots from the Sorcerer will not fill the page horizontally. Therefore, in the 960-dot routine, the 512 Sorcerer dots are put near the center of the page by putting 19 blank characters at the left of the screen. If you want to change this left-side margin, change the byte at 222BH in that routine. It is 13H now (19 decimal). You could make it any value from zero to 25H (37 decimal) without chopping off one side of your display.

One problem with the 480-dot display is that you can't put the full 512 Sorcerer dots on the paper. Another way to put it, is that you can print on 60 of the 64 characters in each line. However, you can choose which 480 dots (69 Sorcerer characters) you want to print. With these routines, you can choose to print the first 480 dots (CTRL-K), the middle 480 dots (CTRL-N), or the last 480 dots (CTRL-O).

Another problem with the 480-dot display is that the ratio of the vertical dimension to the horizontal dimemsion on the printer is not the same as it is on the screen. The printer display is relatively streched horizontally. The problem is that the 8 by 8 blocks of dots that the Sorcerer screen produces are rectangles, not squares. The 960-dot display is siilar to the Sorcerer display, so you might prefer it even though is small. If you wanted a printed display that produced squares of 8 by 8 dots you might prefer the 480-dot routines.

Printing Lines of Dots

Now we come to the actual business of sending lines of dots to the printer. As is perhaps obvious, we will take the pattern of dots from the screen, character by character, and send it to the printer. Perhaps it is also obvious to anyone familiar with the Sorcerer that the screen RAM contains codes that tell the computer where to find the pattern of dots in the character memory. Therefore, after sending some control codes to the printer, the first thing we must do is to get each character from the screen RAM at "LINE" and then find the 8 bytes in the character memory starting at F800H that produce those characters. Since there is a fixed mathematical relationship between the character code and the representation of that character in memory, we can calculate the address of that representation. Hence, we multiply the character code by 8 in "MULT" and add it to the start of the character memory, "TOP:," to get the location of the desired 8 bytes of dots.

Perhaps it is also obvious that since each line on a Sorcerer screen is 8 bits high, we really want a printer that can print 8 dots in each line. Epson printers do that, but the Paper Tiger has only seven print wires. Therefore, it is relatively easy to send the screen display to an Epson printer. All we must do is to take the eight bytes which represent the eight rows of dots in each character, and rearrange them as eight columns of dots before sending them to the printer. That takes a bit of programming, but it is not at all as difficult as dealing with a printer that prints only 7 dots.

```
                    <        B        >

ORIGINAL BYTE       0 . . . . . . . .---
                    1 . . . . . . . .
                    2 . . . . . . . .
                    3 . . . . . . . .
                    4 . . . . . . . . L
                    5 . . . . . . . .
                    6 . . . . . . . .
                    7 . . . . . . . .---
```

To make the rearrangement of dots, we set register L to a number that represents one of original bytes for each character. If you consult the Graftrax instructions, you will see that the top bit of each column of print is the most significatn bit. Therefore, we initially make the top bit a 1 (L = 128 decimal) to denote the first original byte. Thereafter, we shift L right to represent the other 7 original bytes.

Register B represents the bits we are selecting to send to the printer. Since we want to collect all the left-hand bits first and they are the most significant bits in the original bytes, we set the top bit of B to 1 to start (B = 128 decimal).

Once we have these two registers set, we examine each of the original bytes to determine if it has a 1 in the position we are collecting. That is, we compare bits in the original bytes with the bit in B. If the bits match, we transfer the bit to E, where we are collecting the output byte. When we have collected all 8 bits in E, we send them, restore L to the first original byte (128 decimal), and shift B to point to the next column of bits.

The rest of the procedure is fairly obvious. As we progress through the line, we decrement the character counter in register C until it reaches zero. Then, at the end of each line, we send a carriage return and line feed. After 30 lines, which register H records, we terminate the routine, and return to the main part of Exec-A-Sketch.

Conclusion

That concludes the modifications to Exex-A-Sketch. All you need is a copy of the program and you can enter the new code.

The Help Table

Addr	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0170:																43
0180:	54	52	4C	2D	46	20	3D	20	66	69	6E	65	20	70	74	20
0190:	20	20	43	54	52	4C	2D	43	20	3D	20	6D	6F	6E	69	74
01A0:	6F	72	20	4D	58	2D	38	30	20	70	72	69	6E	74	69	6E
01B0:	67	0D	20	20	43	54	52	4C	2D	4D	20	3D	20	6D	65	64
01C0:	69	75	6D	20	70	74	20	43	54	52	4C	2D	53	20	3D	20
01D0:	73	61	76	65	20	20	20	20	43	54	52	4C	2D	42	20	3D
01E0:	20	63	6F	6E	64	65	6E	73	65	64	0D	20	20	43	54	52
01F0:	4C	2D	54	20	3D	20	74	65	78	74	20	6D	6F	64	65	20

Addr	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0200:	43	54	52	4C	2D	4C	20	3D	20	6C	6F	61	64	20	20	20
0210:	20	43	54	52	4C	2D	4B	20	3D	20	66	69	72	73	74	20
0220	36	30	20	63	68	61	72	73	2E	0D	20	20	43	4C	45	41
0230:	52	20	20	3D	20	63	6C	65	61	72	20	20	20	20	20	43
0240:	54	52	4C	2D	48	20	3D	20	68	65	6C	70	20	20	20	20
0250:	43	54	52	4C	2D	4E	20	3D	20	6D	69	64	64	6C	65	20
0260:	36	30	0D	20	20	43	54	52	4C	2D	50	20	3D	20	70	72

```
0270:  69 6E 74 20  6F 6E 20 50  61 70 65 72  20 54 69 67
0280:  65 72 20 20  20 20 20 20  20 43 54 52  4C 2D 4F 20
0290:  3D 20 6C 61  73 74 20 36  30 0D 0D 20  20 55 73 65
02A0:  20 61 6E 79  20 6F 66 20  74 68 65 20  65 69 67 68
02B0:  74 20 64 69  72 65 63 74  69 6F 6E 61  6C 20 6B 65
02C0:  79 73 20 6F  6E 20 74 68  65 20 6E 75  6D 65 72 69
02D0:  63 20 70 61  64 0D 20 20  6F 72 20 74  68 65 20 6A
02E0:  6F 79 73 74  69 63 6B 20  74 6F 20 70  6F 73 69 74
02F0:  69 6F 6E 20  74 68 65 20  63 75 72 73  6F 72 20 6F

Addr   0  1  2  3   4  5  6  7   8  9  A  B   C  D  E  F

0300:  72 20 70 65  6E 20 70 6F  69 6E 74 2E  0D 0D 54 65
0310:  78 74 20 6D  6F 64 65 3A  0D 0D 20 20  43 54 52 4C
0320:  2D 80 20 3D  20 6D 6F 76  65 20 63 6F  6C 75 6D 6E
0330:  20 75 70 20  20 20 20 43  54 52 4C 2D  81 20 3D 20
0340:  6D 6F 76 65  20 72 6F 77  20 72 69 67  68 74 0D 20
0350:  20 43 54 52  4C 2D 82 20  3D 20 6D 6F  76 65 20 63
0360:  6F 6C 75 6D  6E 20 64 6F  77 6E 20 20  43 54 52 4C
0370:  2D 83 20 3D  20 6D 6F 76  65 20 72 6F  77 20 6C 65
0380:  66 74 0D 0D  20 20 50 72  65 73 73 69  6E 67 20 61
0390:  6E 79 20 6C  65 74 74 65  72 2C 20 67  72 61 70 68
03A0:  69 63 20 6F  72 20 6E 75  6D 65 72 69  63 20 6B 65
03B0:  79 20 28 65  78 63 65 70  74 0D 20 20  64 69 72 65
03C0:  63 74 69 6F  6E 61 6C 20  6B 65 79 73  29 20 77 69
03D0:  6C 6C 20 63  61 75 73 65  20 74 68 65  20 61 74 65
03E0:  6F 63 69 61  74 65 64 20  63 61 68 72  61 63 74 65
03F0:  72 0D 20 20  74 6F 20 61  70 70 65 61  72 20 69 6E

Addr   0  1  2  3   4  5  6  7   8  9  A  B   C  D  E  F

0400:  20 74 68 65  20 63 75 72  72 65 6E 74  20 63 75 72
0410:  73 6F 72 20  70 6F 73 69  74 69 6F 6E  2E 0D 0D 44
0420:  72 61 77 69  6E 67 20 6D  6F 64 65 73  3A 0D 0D 20
0430:  20 55 20 3D  20 70 65 6E  20 75 70 20  20 20 20 20
0440:  20 20 20 20  20 20 20 20  20 20 20 20  45 20 3D 20
0450:  75 73 65 20  65 72 61 73  65 72 0D 20  20 44 20 3D
0460:  20 70 65 6E  20 64 6F 77  6E 20 20 20  20 20 20 20
0470:  20 20 20 20  20 20 20 20  4D 20 3D 20  6D 61 72 6B
0480:  20 6C 69 6E  65 20 73 74  61 72 74 0D  20 20 49 20
0490:  3D 20 75 73  65 20 69 6E  6B
```

The Added Print Routines

```
0000                00000  ;This is the MX-80 patch for the Exec-A-sketch
0000                00001  ;       program.  It is written in Zetu, so
0000                00002  ;       hexadecimal numbers have # signs in front
0000                00003  ;       and relative jumps are denoted as
0000                00004  ;       JR RETURN, for example, not JR RETURN-$.
0000                00005  ;
0000                00006  ;First, we must call this routine in two places.
0000                00007  ;
0000                00008          ORG  #12C0
12C0                00009  ;
12C0 CD 10 22       00010  LINK1   CALL PATCH          ;CALL THE ROUTINE
12C3 00             00011          NOP                 ;FILL SPACE WITH NOP
```

```
12C4                00012  ;
12C4                00013          ORG    #18C9
18C9                00014  ;
18C9 CD 10 22       00015  LINK2   CALL PATCH
18CC 00             00016          NOP
18CD                00017  ;
18CD                00018  ;The rest of the program extends the process of
18CD                00019  ;       detecting control codes.
18CD                00020  ;
18CD                00021          ORG    #2210
     E021           00022  PARLOT  EQU    #E021          ;PARALLEL OUTPUT
     F080           00023  VID:    EQU    #F080          ;START OF SCREEN RAM
     F800           00024  TOP:    EQU    #F800          ;START CHARACTER MEMORY
     001B           0005   ESC     EQU    27             ;ESC CODE
2210                00026  ;
2210                00027  ;First, there is a link to the print routine for
2210                00028  ;       the Paper Tiger.
2110                00029  ;
2210 FE 10          00030  PATCH   CP     #10            ;CTRL-P?
2212 20 01          00031          JR     NZ,M1960       ;NOT PAPER TIGER, JUMP
2214 C9             00032          RET                   ;IT'S TIGER, GO BACK
2215                00033  ;
2215                00034  ;This is the 960 dots-per-line routine for the
2215                00035  ;       Epson printer
2215                00036  ;
2215 FE 02          00037  M960    CP     #02            ;CTRL-B?
2217 20 43          00038          JR     NZ,F480        ;JUMP IF NOT 960 DOTS
2219 CD CF 22       00039          CALL   FIRST          ;DO PRELIMINARY CHORES
221C FD 21 80 F0    00040          LD     IY,VID:        ;IY=SCREEN RAM ADDRESS
2220 3E 1B          00041          LD     A,ESC          ;SET TAB AT COLUMN 19
2222 CD 21 E0       00042          CALL   PARLOT
2225 3E 44          00043          LD     A,"D"
2227 CD 21 E0       00044          CALL   PARLOT
222A 3E 13          00045          LD     A,19
222C CD 21 E0       00046          CALL   PARLOT
222F 3E 00          00047          LD     A,0
2231 CD 21 E0       00048          CALL   PARLOT
2234 3E 0D          00049          LD     A,#0D          ;CLEAR BUFFER WITH CR
2236 CD 21 E0       00050          CALL   PARLOT
2239 3E 09          00051  SETUP   LD     A,9            ;TAB TO COLUMN 19
223B CD 21 E0       00052          CALL   PARLOT
223E 3E 1B          00053          LD     A,ESC          ;PREPARE FOR 512 COLUMNS
2240 CD 21 E0       00054          CALL   PARLOT
2243 3E 4C          00055          LD     A,"L"
2245 CD 21 E0       00056          CALL   PARLOT
2248 3E 00          00057          LD     A,0            ;0 + ...
224A CD 21 E0       00058          CALL   PARLOT
224D 3E 02          00059          LD     A,2            ;... 2 * 256 = 512
224F CD 21 E0       00060          CALL   PARLOT
2252 0E 40          00061          LD     C,64           ;C=CHARACTERS IN A LINE
2254 CD F8 22       00062          CALL   LINE           ;PRINT A LINE
2257 25             00063          DEC    H              ;NEXT LINE
2258 20 DF          00064          JR     NZ,SETUP       ;LOOP FOR 30 LINES
225A 18 49          00065          JR     RESET
225C                00066  ;
225C                00067  ;This routine prints the first 480 dots.
```

```
225C                    00068  ;
225C FE 0B              00069  F480    CP     #0B             ;CTRL-K?
225E 20 09              00070         JR     NZ,M480         ;JUMP IF NOT F480
2260 CD CF 22           00071         CALL   FIRST           ;DO PRELIMINARY CHORES
2263 FD 21 80 F0        00072         LD     IY,VID:         ;START AT LETTER 0
2267 18 18              00073         JR     COMBO
2269                    00074  ;
2269                    00075  ;This routine prints the middle 480 dots.
2269                    00076  ;
2269 FE 0E              00077  M480    CP     #0E             ;CTRL-N?
226B 20 09              00078         JR     NZ,L480         ;JUMP IF NOT M480
226D CD CF 22           00079         CALL   FIRST           ;DO PRELIMINARY CHORES
2276                    00083  ;This routine prints the last 480dots.
2276                    00084   ;
2276 FE 0F              00085  L480    CP    #0F              ;CTRO-O?
2278 20 4F              00086         JR    NZ,NOPRT         ;NOT A PRINT CODE
227A CD CF 22           00087         CALL FIRST             ;DO PRELIMINARY CHORES
227D FD 21 84 F0        00088         LD    IY,VID:+4        ;START AT LETTER 4
2281                    00089  ;
2281                    00090  ;THIS PART IS USED BY ALL 480-DOT ROUTINES.
2281                    00091  ;
2281 3E 1B              00092  COMBO  LD    A,ESC            ;PREPARE FOR 480COLUMNS
2283 CD 21 E0           00093         CALL PARLOT
2286 3E 4B              00094         LD    A,"K"
2288 CD 21 E0           00095         CALL PARLOT
228B 3E E0              00096         LD    A,224            ;224+...
228D CD 21 E0           00097         CALL PARLOT
2290 3E 01              00098         LD    A,1              ;... 1 * 256 = 480
2292 CD 21 E0           00099         CALL PARLOT
2295 0E 3C              00100         LD C,60                ;C=CHARACTERS IN A LINE
2297 CD F8 22           00101         CALL LINE              ;PRINT A LINE
229A FD 23              00102         INC   IY               ;JUMP 4 CHARACTERS
229C FD 23              00103         INC   IY
229E FD 23              00104         INC   IY
22A0 FD 23              00105         INC   IY
22A2 25                 00106         DEC   H                ;NEXT LINE
22A3 20 DC              00107         JR    NZ,COMBO         ;LOOP FOR 30 LINES
22A5                    00108  ;
22A5                    00109  ;This ends all routines.
22A5                    00110  ;
22A5 3E 1B              00111  RESET  LD    A,ESC            ;SPACING TO 12/72 IN.
22A7 CD 21 E0           00112         CALL PARLOT
22AA 3E 41              00113         LD    A,"A"
22AC CD 21 E0           00114         CALL PARLOT
22AF 3E 0C              00115         LD    A,12
22B1 CD 21 E0           00116         CALL PARLOT
22B4 FD E1              00117         POP IY                 ;RESTORE REGISTERS
22B6 DD E1              00118         POP IX
22B8 E1                 00119         POP HL
22B9 D1                 00120         POP DE
22BA C1                 00121         POP BC
22BB F1                 00122         POP AF
22BC FD 36 00 FF        00123         LD   (IY+00),#FF   ;RESTORE WHITE CURSOR
22C0                    00124  ;
22C0                    00125  ;We come here when we have found the control
22C0                    00126  ;       code and we must jump back to the other
```

```
22C0                00127  ;       routines.
22C0                00128  ;
22C0 D9             00129          EXX                     ;ALTERNATE REGISTER
22C1 01 0F 00       00130          LD    BC,#000F          ;CHANGE TO JP INSTR.
22C4 E1             00131  RETURN  POP   HL                ;GET RETURN ADDRSS
22C5 09             00132          ADD   HL,BC             ;CHANGE IT
22C6 E5             00133          PUSH  HL                ;STORE NEW RETURN ADR.
22C7 D9             00134          EXX                     ;MAIN REGISTERS
22C8 C9             00135          RET                     ;BACK TO ORGINAL CODE
22C9                00136  ;
22C9                00137  ;We come here when we want to continue the
22C9                00138  ;       search for the control code.
22C9 D9             00139  NOPRT   EXX                     ;ALTERNATE REGISTERS
22CA 01 12 00       00140          LD    BC,#0012          ;CHANGE TO CP INSTR.
22CD 18 F5          00142          JR    RETURN            ;CHANGE RETURN ADDRESS
22CF                00143  ;
22CF                00144  ;The first part is used by all Epson routines.
22CF                00145  ;
22CF FD 36 00 20    00146  FIRST   LD    (IY+00),#20       ;ERASE THE CURSOR
22D3 D9             00147          EXX                     ;STORE RETURN ADDRESS
22D4 E1             00148          POP   HL                ;    IN HL'
22D5 D9             00149          EXX
22D6 F5             00150          PUSH  AF                ;STORE REGISTERS
22D7 C5             00151          PUSH  BC
22D8 D5             00152          PUSH  DE
22D9 E5             00153          PUSH  HL
22DA DD E5          00154          PUSH  IX
22DC FD E5          00155          PUSH  IY
22DE D9             00156          EXX                     ;PUT RETURN ADDRESS
22DF E5             00157          PUSH  HL                ;  BACK ON THE STACK
22E0 D9             00158          EXX
22E1 26 1E          00159          LD    H,30              ;H=LINE NUMBER
22E3 3E 1B          00160          LD    A,ESC             ;LINE SPACING 8/72 IN.
22E5 CD 21 E0       00161          CALL  PARLOT
22E8 3E 41          00162          LD    A,"A"
22EA CD 21 E0       00163          CALL  PARLOT
22ED 3E 08          00164          LD    A,8
22EF CD 21 E0       00165          CALL  PARLOT
22F2 3E 0D          00166          LD    A,#0D             ;CLEAR BUFFER WITH CR
22F4 CD 21 E0       00167          CALL  PARLOT
22F7 C9             00168          RET
22F8                00169  ;
22F8                00170  ;This is the part that sends one line to the
22F8                00171  ;       printer.
22F8                00172  ;
22F8 FD 5E 00       00173  LINE    LD    E,(IY+00)         ;GET THE NEXT CHARACTER
22FB 3E 00          00174  MULT    LD    A,0               ;CLEAR A
22FD CB 23          00175          SLA   E                 ;MOVE E LEFT. DOUBLES IT
22FF 30 02          00176          JR    NC,MULT1
2301 C6 04          00177          ADD   A,#04             ;IF CARRY, ADD 4 TO A
2303 CB 23          00178  MULT1   SLA   E                 ;MULTIPLIED BY 4 NOW
2305 30 02          00179          JR    NC,MULT2
2307 C6 02          00180          ADD   A,2               ;IF CARR, ADD 2 TO A
2309 CB 23          00181  MULT2   SLA   E                 ;MULTIPLIED BY 8 NOW
230B 30 02          00182          JR    NC,MULT3
230D C6 01          00183          ADD   A,1               ;IF CARRY, PUT IN 1 MORE
```

```
230F 57           00184  MULT3  LD   D,A          ;D=HIGH BYTE OF E*8
2310 DD 21 00 F8  00185         LD   IX,TOP:      ;TOP: + DE EQUALS
2314 DD 19        00186         ADD  IX,DE        ;START OF CHAR. BYTES
2316 DD E5        00187         PUSH IX           ;STARTING BYTE STORED
2318 06 80        00188         LD   B,128        ;B=BYTES SENT
231A 2E 80        00189  PRT8   LD   L,128        ;L=BITS IN THOSE BYTES
231C 1E 00        00190         LD   E,0          ;E=STORAGE FOR BITS
231E DD E1        00191         POP  IX           ;GET 1ST CHAR ADDRESS
2320 DD E5        00192         PUSH IX           ;BUT KEEP IT STORED 2322 DD
2322 7E 00        00193  ASSBL  LD   A,(IX+00)    ;CHARACTER BYTE TO A
2325 A0           00194         AND  B            ;IS THE B BIT A 1
2326 28 03        00195         JR   Z,ASSBL1     ;IF NOT, JUMP
2328 7B           00196         LD   A,E          ;GET BYTE SO FAR
2329 85           00197         ADD  A,L          ;ADD THE APPROPRIATE BIT
232A 5F           00198         LD   E,A          ;STORE THE RESULT
232B DD 23        00199  ASSBL1 INC  IX           ;NEXT BYTE
232D CB 3D        00200         SRL  L            ;NEXT BIT POSITION
232F 20 F1        00201         JR   NZ,ASSBL     ;LOOP UNTIL L=0
2331 7B           00202         LD   A,E          ;GET COMPLETE BYTE
2332 CD 21 E0     00203         CALL PARLOT       ;SEND IT
2335 CB 38        00204         SRL  B            ;NEXT COLUMN OF DOTS
2337 20 E1        00205         JR   NZ,PRT8      ;LOOP FOR 8 COLUMNS
2339 DD E1        00206         POP  IX           ;SCRATCH STARTING BYTE
233B FD 23        00207         INC  IY           ;NEXT CHARACTER
233D 0D           00208         DEC  C            ;ONE LESS CHAR IN LINE
233E 20 B8        00209         JR   NZ,LINE      ;LOOP UNTIL LINE ENS
2340 3E 0D        00210         LD   A,#0D        ;SEND CARRIAGE RETURN
2342 CD 21 E0     00211         CALL PARLOT
2345 3E 0A        00212         LD   A,#0A        ;AND LINE FEED
2347 CD 21 E0     00213         CALL PARLOT
234A C9           00214         RET
```

SYMBOL TABLE

ASSBL1	232B	ASSBL	2322	COMBO	2281	ESC	001B
FIRST	22CF	F480	225C	L480	2276	LINE	22F8
LINK2	18C9	LINK1	12C0	MULT3	230F	MULT2	2309
MULT1	2303	MULT	22FB	M480	2269	M960	2215
NOPRT	22C9	PRT8	231A	PARLOT	E021	PATCH	2210
RETURN	22C4	RESET	22A5	SETUP	2239	TOP:	F800
VID:	F080						

Random I/O

By

Tommy Stokes

Should you keep your Sorcerer? Yes! Worried about it being obsolete? Just think of how many new machines are being made using the Z80 and running CP/M. Those manufacturers aren't worried about producing an obsolete machine. Should you? If you have a Sorcerer and are only using cassettes your choice of software is very limited, but you can upgrade to a disk system for a reasonable price.

For instance, the Commodore 64 sells for $200, but adding a disk drive costs $250 and adding a color monitor another $250. You now have a disk based computer for $700 that is a good value and has color, however, the disk drive is slow, the basic is hard to work with, assembly language requires an additional monitor, you have a 40 column screen (and you thought 64 columns were bad), CP/M is an add-on (and you thought it was hard to find CP/M software in Exidy format), etc., etc., etc.

Now don't get me wrong. I'm not running the 64 down. It is a good machine at a very good price. I just want you to think before you junk your Sorcerer and buy another machine. Do you really need to? Use that money to buy a disk drive or S-100 box. Then you will be adaptable and in step with the rest of the world. If you want to expand, you can buy a S-100 board. If you want software buy CP/M software. That's what people with Kaypros and other Z80 machines are doing. If you can't find your format (which most soft-sectored people can't), there are several people who will convert for you at a very reasonable price. Among those are Creative Computing Products or Eaglenest Software.

What I really want to get across is that the Sorcerer is a good machine, there are many people using it, and there is no reason to panic. Keep your Sorcerer, expand your Sorcerer, and use your Sorcerer. Only you can limit what your Sorcerer will do.

For Sale -

Micropolis hard sectored single drive system
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Gene Lubker
1134 Cynthia Square
Mountain Home, AR 72653
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CPMINT - A program that converts your programs between Exidy Hard and Soft sector formats. (disk $34.95)

Tapechk - A program that allows you to view and read tapes, even if they contain CRC errors. User selects viewing of input in ASCII, hex, or headers only, or you can load tape data into memory. (tape $9.95)

FIRMWARE

ROMPAC DISK BASIC - This upgrade to the standard Exidy Basic ROMPAC maintains all of the current BASIC features, while adding two important NEW commands: The DSAVE command allows you to save basic programs directly to disk. The files can be read back in with the new DLOAD command. You also get an easy-to-use, full-screen Basic editor!!!

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